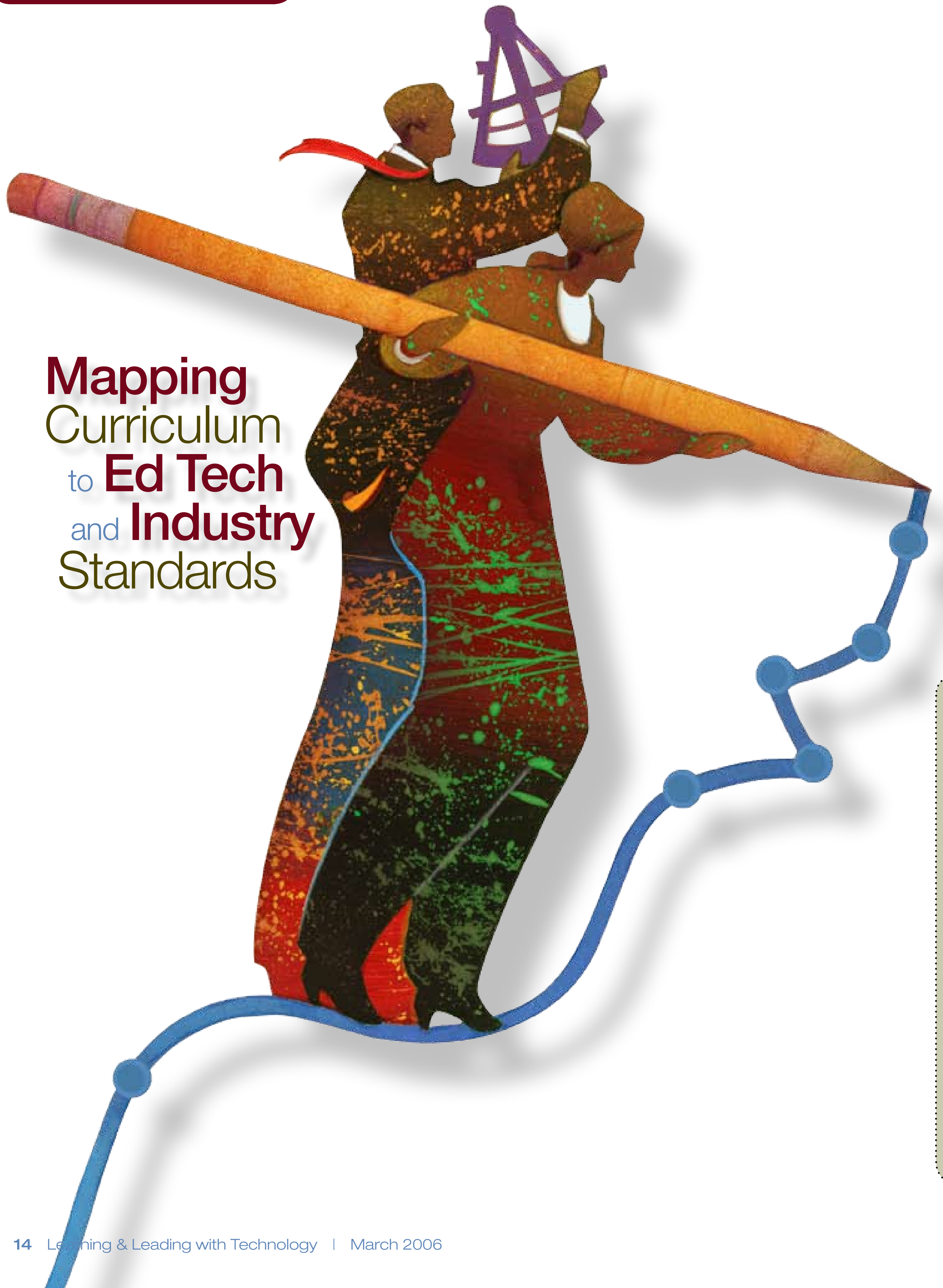
By Bjorn Norstrom

Mapping Curriculum to Ed Tech and Industry Standards



Ever since technology became a major component in education, schools have been charged with teaching and integrating technology to enhance learning and ensure technology literacy. However, there is still no consistent definition, process, or assessment in place, leading to concerns about accountability. Because technology standards are seemingly arbitrary and open to multiple interpretations, each school district, each school, and even each teacher will have to develop their own definition, process, and assessments. This leaves schools and teachers charged with an overwhelming responsibility; subsequently, technology integration and assessments vary greatly among teachers, school districts, and states. If a goal of PK–12 education is to prepare our students to compete in the high-tech global economy, multiple areas regarding technology need to be addressed by various educational stakeholders to ensure we are prepared for this challenge:

- National and state standards
- Assessments
- Teacher preparation programs
- Initial licensing and relicensing

Current Reality

Let's start with the NETS Performance Indicators. For example, before completing eighth grade, students will "apply strategies for identifying and solving routine hardware and software problems that occur during everyday use." However, no routine problems are identified, so what specifically does this statement expect a student to be able to do? Realistically, the answer can vary. It can be argued that something as simple as checking that the cables are connected is the extent of routine hardware problems. It could also be as complicated as upgrading RAM.

Furthermore, the correlation between national and state standards is sometimes questionable. For example, the Vermont technology grade expectations claim to correspond with the NETS for Students (NETS•S) Performance Indicator: "Students demonstrate a sound understanding of the nature and operation of technology systems." However, the Vermont grade expectations are limited to the use of a mouse, keyboard, digital capturing tools, and removable media. That begs the question: Is proficient use of a mouse, keyboard, a digital camera, and removable media the same as demonstrating "sound understanding of the nature and operation of technology systems"? Depending on whom you ask, the answer will be different. Although hardware is only used as an example, the theory applies across the board. Thus, larger issues need to be addressed: Are the NETS too ambiguous? Are state standards too low? Do existing technology standards merely promote skills students and teachers need to survive rather than to succeed? Without clear definitions and standardized assessments, the concept of technology literacy is highly elusive and interpretive.

Technology Curriculum Map

To address these issues, Colchester Middle School in Colchester, Vermont, developed a Technology Curriculum Map, a portion of which appears on the next page. Limiting ourselves to only the NETS and Vermont technology standards would not provide the technology opportunities we envisioned for our students and teachers. Therefore, we also consulted the technology industry. One goal was to address process and assessment, incorporating approaches from both educational and industry organizations. Another goal was to develop a solution for validating our compliance with the No Child Left Behind (NCLB) Enhancing Education Through Technology (EETT) Act of 2001, as this is what we ultimately are held to. Therefore, we used EETT as the backbone, while various educa-

Standards

The following standards and objectives were reviewed and incorporated into the Colchester Middle School Technology Curriculum Map:

Educational

- EETT
- ISTE's NETS•S Performance Indicators: http://cnets.iste.org/students/s_profiles.html
- ISTE's NETS for Teachers (NETS•T) Performance Indicators: http://cnets.iste.org/teachers/t_profile-pro.html
- Grade Expectations for Vermont's Framework of Standards and Learning Opportunities: Information Technology: http://www.state.vt.us/educ/new/pdfdoc/pubs/grade_expectations/information_technology.pdf
- Vermont Education Technology Specialist Endorsement: http://www.state.vt.us/educ/new/pdfdoc/board/rules/5440.pdf#subj_tech

Industry

- Certiport Inc.'s Internet and Computing Core Certification (IC^3) Test Objectives: http://www.certiport.com/Portal/desktopdefault.aspx?page=common/pagelibrary/TestObjectives_IC3.htm
- Microsoft Office Specialist (MOS) Exam Skill Standards: http://www.microsoft.com/learning/mcp/officespecialist/requirements.asp
- The Computing Technology Industry Association (CompTIA) A+ Objectives: http://www.comptia.org/certification/a/default.aspx

tional and industry standards filled out the map. Simply put, the purpose of our Technology Curriculum Map was to combine educational and industry standards and assessments into one comprehensive program.

Process

To appreciate our Technology Curriculum Map, one has to understand that there are two general approaches to delivering technology education and assessments: PK–12 and industry, each with strengths and weaknesses. An effective map incorporates the strengths of each approach.

Colchester Middle School had just been granted resources for the establishment of a technology education program, so we had the opportunity to develop a new program from the ground up. Drawing from successful experiences from adult settings with Certiport's Internet and Computing Core Certification (IC^3), we decided to evaluate how this commercially developed program would fit into our middle school model. IC^3 is a globally recognized measure of computer literacy. IC^3 covers many of the same topics as national and state standards, and it provides detailed objectives, a systematic process, structured learning materials, and standardized assessments. To address other areas of technology not covered by IC^3, Colchester Middle School had to incorporate Microsoft and CompTIA standards. By doing so, we were able to develop a comprehensive technology curriculum, accountable to both education and industry interests.

A Portion of a Colchester Middle School Technology Map

I. Unit of Study: Word Processing (Microsoft Word)

II. Standards Addressed

NETS•S Performance Indicators

- Apply productivity/multimedia tools and peripherals to support personal productivity, group collaboration, and learning throughout the curriculum.
- Select and use appropriate tools and technology resources to accomplish a variety of tasks and solve problems.

VT IT3: 1.19, 1.20, 1.21, 1.25
Word Processing

- Students use technology tools to enhance learning, increase productivity, and promote creativity.
- Students use productivity tools to collaborate in constructing technology-enhanced models, preparing publication, and produce other creative work.

IC^3 Module 2: 1.1, 1.2, 1.3, 1.4, 2.1, 2.2
Microsoft Word

- Start and exit Microsoft Word and utilize sources for online help.
- Identify common on-screen elements of Microsoft Word, change Microsoft Word settings, and manage files within Microsoft Word.
- Perform common editing and formatting functions.
- Perform common printing functions.
- Format texts and documents including the use of automatic formatting tools.
- Add tables and graphics to a document.

Microsoft Office Specialist (MOS)
Word 2002 Core

- Inserting and modifying text
- Creating and modifying paragraphs
- Formatting documents
- Managing documents
- Working with graphics
- Workgroup collaboration

Key Vocabulary	*Standards Addressed*	*Skills Addressed*	*Recommended Skills by Grade Level*
Align Ask a question box Bibliography Bold Bulleted list Chart Column Copy Cut Diagram	*VT IT3: 1.19, 1.20, 1.21, 1.25* Word Processing • Students use technology tools to enhance learning, increase productivity, and promote creativity. • Students use productivity tools to collaborate in constructing technology-enhanced models, preparing publication, and produce other creative work.	*VT IT3: 1.19, 1.20, 1.21, 1.25* Word Processing • Entering, selecting, deleting text. • Manipulating styles (e.g., bold, italic, and underline). • Combining text with pictures on a single page (e.g., inserting clipart). • Adding non-textual elements (e.g., arrows, lines, shapes, etc.). • Manipulating styles (e.g., fonts, style, size, color of text, alignment).	*Grade 1* VT IT • Entering, selecting, deleting text. • Manipulating styles (e.g., bold face, italicize, and underline). IC^3 • Start and exit Microsoft Word. • Create new files. • Open files. • Save files. • Print files. MOS • Insert, modify, and move text and symbols.

Following the process of mapping the various educational and industry standards, it is a matter of deciding what topics should be implemented in each grade level. Breaking down detailed standards into each individual grade level rather than grade ranges offers an additional benefit: accountability. Each teacher in each grade level can be held accountable for incorporating and teaching certain aspects of technology.

Assessments

Technology assessment is an area seemingly untouched by national and state education organizations. According to NCLB, schools are required to show progress in math and reading test scores in grades three through eight. For students, there is no technology equivalent to the standardized tests used for core subjects. For prospective teachers, there is neither a technology literacy assessment in the ETS The Praxis Series nor an established technology assessment component for experienced teachers during the relicensing process. Prospective and experienced teachers can achieve initial licensure and relicensure without ever being expected to validate or demonstrate that they are technology literate through a quantifiable and standardized assessment mechanism.

Without assessments provided on a national or state level, how do we know when or if students and teachers are technology literate? We don't! To address the issue of assessment, Colchester Middle School is implementing two distinct methods: project-based and exam-based. Projects, commonly used in schools, provide evidence of a student's effectiveness in the application of technology but can be difficult to interpret, quantify, and replicate. Standardized exams, applied in the industry, provide evidence of a variety of higher and lower level abilities and skills and can be easily interpreted, quantified, and replicated. Although our project-based assessments are developed in-house, we use commercially produced, industry-focused standardized exams.

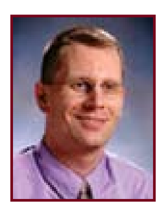
Implementation

Colchester Middle School is in the first school year of a three-year implementation process. This year, we focus on software and project-based assessments for our 600 students. For a pilot group of teachers, we focus on technology literacy: hardware, operating systems, software, networks, e-mail, the Internet, and commercially produced standardized assessments.

Implementing an approach such as this is obviously easier with students than with teachers. With students, it is only necessary to schedule courses. With teachers, it is quite different. Rather than a mandate, we encourage participation through new, innovative opportunities in which professional partnerships play a major role. Colchester Middle School formed an agreement with nearby Saint Michael's College Department of Graduate Education. Through this agreement, we are able to develop and teach customized graduate technology courses at our middle school using qualified Colchester faculty. Through an agreement with Certiport, we established an Authorized Certiport Center at our middle school, authorizing us to deliver certification training and exams for both IC^3 and Microsoft Office products. Through these partnerships, our teachers can receive graduate credits and industry certifications in various technologies conveniently executed at our middle school. This approach provides teachers with exciting opportunities delivered at our middle school that fit into their relicensing, professional portfolio, master's degree, and technology proficiency validation goals. As a result, faculty who otherwise would never have pursued any technology professional development are doing so and are beginning to implement their new skills into their daily routines. Students, teachers, and parents are expressing an overwhelming excitement to our comprehensive technology approach.

Conclusion

As the old saying goes, "It takes a village to raise a child." For academic disciplines in PK–12, this village generally consists of educational organizations and government agencies. In terms of technology education, the village has to consist of the technology industry as well; the private sector, not education, is the driver of technology. Currently, two approaches exist: one for education and one for the industry, each with strengths and weaknesses. Rather than reinventing the wheel, let us mount the wheel already existing in the industry onto our educational frame. To validate our digital literacy efforts, schools should use the pedagogical expertise found in education, a combination of educational and industry standards, and standardized assessments provided by the industry.



Bjorn Norstrom, a native of Sweden, holds a bachelor's degree in education, a master's degree in teaching English as a second language, and a post-master certificate in information technology. Norstrom is a Vermont licensed teacher, endorsed in four subject areas: educational technology specialist, social studies, English, and English as a second language.